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MEMORANDUM

DATE 23 December 1998

TO: David Bennett, WAM, U.S. EPA, Region X

FROM: Michelle Turner, Chemist, WESTON, Seattle
rum Roger McGinnis, Senior Environmental Chemist, WESTON, Seattle

SUBJECT: Validation of Polychlorinated Biphenyls (Congeners) Data
Laboratory Batch: K9806374
Site: Duwamish River

WORK ASSIGNMENT NO 46-23-0JZZ

WORK ORDER NO 4000-019-038-5200-00

DOC. CONTROL NO : 4000-019-038-AAAK

cc. Bruce Woods, RAP-WAM, U.S. EPA, Region X
Dena Hughes, Site Manager, WESTON, Seattle (memo only)
Kevin Mundell-Jackson, Database Management, WESTON, Seattle

The quality assurance review of ten sediment samples, laboratory batch K9806374, collected from the Duwamish River has been completed. Samples were analyzed for polychlorinated biphenyls as individual congeners using EPA Method 8082 by Columbia Analytical Services of Kelso, Washington. The samples were numbered.

98384000	98384001	98384002	98384003	98384004
98384005	98384006	98384007	98384008	98384009

Data Qualifications

The following comments refer to the laboratory performance in meeting the quality control criteria described in the technical specifications of the laboratory subcontract. The review follows the format described in the *National Functional Guidelines for Organic Data Review* (EPA OSWER Directive 9240.1-05, February 1994).

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QA Review Batch K9806374 (PCB Congeners)

Site: Duwamish River

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1. Timeliness

All samples were extracted 38 days after sample collection, exceeding the 14 day holding time criteria in the Sampling and Analysis Plan. However, prior to extraction, samples were stored frozen, thus extending the holding time. Samples were extracted within the 12 month holding time recommended by PSEP for frozen samples.

2. Initial Calibration

A six point initial calibration was performed using tetrachloro-meta-xylene (TCMX) as an internal standard. Relative response factors (RRF) were calculated for each target congener. The RRF percent relative standard deviation (%RSD) was less than 20 percent for all analytes, otherwise, regression was used for quantitation.

3. Calibration Verification

Calibration verification standards were analyzed every 12 hours using a midrange standard. The RRF percent difference was less than 25 percent of the initial calibration value with the following exceptions:

Analysis Date	Compound	% Diff	Associated Samples
11/2/98	PCB77	141	98384000 through 98384003 98384005
11/3/98	PCB77	146	8384004 98384006 through 98384009

Results and quantitation limits for samples listed above were qualified as estimated (UJ/J)

4. Retention Time Windows

Relative Retention Time Windows were calculated from initial calibration. Retention times for calibration verification standards were within established windows of ± 0.06 RRT

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5. Detection Limits

Instrument detection limits met project required quantitation limits with the following exceptions:

Sample	Compound	QL Goal (µg/Kg)	Reported QL (µg/Kg)
98384002	PCB77	1	7
98384002	PCB123	1	6
98384002	PCB195	1	2
98384004	PCB18	1	24
98384004	PCB77	1	6
98384004	PCB123	1	7
98384007	PCB52	1	3
98384009	PCB28	1	2

Where quantitation limit goals were exceeded, undetected analytes were qualified (UI) to indicate matrix interference.

6. Blanks

a) Laboratory Method Blanks

Laboratory method blank frequency criteria were met.

No target analytes were reported in laboratory method blanks

b) Field Blanks

No field blanks were associated with this laboratory batch

7. System Monitoring Compounds (Surrogates)

Hexabromobiphenyl (HBB) was used as a surrogate. The surrogate compound percent recovery met quality control criteria for all samples.

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8. Matrix Spike and Matrix Spike Duplicate

Matrix spike (MS) or matrix spike duplicate (MSD) percent recovery for the following compounds were outside QC guidelines

Sample	Compound	Percent Recovery	QC Limits
98384006MS	PCB77	15	60-140
98384006MS	PCB118	58	60-140
98384006MS	PCB153	58	60-140
98384006MS	PCB156	56	60-140
98384006MS	PCB157	59	60-140
98384006MS	PCB209	50	60-140
98384006DMS	PCB52	58	60-140
98384006DMS	PCB77	15	60-140
98384006DMS	PCB128	59	60-140
98384006DMS	PCB195	58	60-140
98384006DMS	PCB209	42	60-140

Relative percent differences (RPD) between the MS and MSD percent recoveries met QC guidelines for all compounds. No action was taken based solely on MS/MSD data

9. Laboratory Control Sample (LCS) Analysis

LCS percent recoveries were outside the QC limits for the following compounds:



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Sample	Compound	Percent Recovery	QC Limits
K981022-LCS	PCB18	57	70-130
K981022-LCS	PCB28	66	70-130
K981022-LCS	PCB52	69	70-130
K981022-LCS	PCB44	66	70-130
K981022-LCS	PCB101	54	70-130
K981022-LCS	PCB128	69	70-130

Results for compounds listed above were qualified as estimated (J) Undetected compounds were also qualified as estimated (UJ).

10. Field Duplicate Analysis

No field duplicates were associated with this sample delivery group.

11. Second Column Confirmation

The relative percent difference (RPD) in reported analyte concentration was greater than 35 percent for the primary and confirmation column for the following samples:

Sample Number	Compound	DB-5 Conc (µg/Kg)	DB-1701 Conc (µg/Kg)	RPD
98384000	PCB28	1	2	67
98384000	PCB52	2	13	147
98384000	PCB44	3	1	100
98384000	PCB101	2	3	40
98384000	PCB118	2	3	40
98384000	PCB138	5	3	50
98384000	PCB170	2	5	86
98384001	PCB44	2	1	67
98384001	PCB101	3	5	50
98384001	PCB105	2	1	67

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Sample Number	Compound	DB-5 Conc (µg/Kg)	DB-1701 Conc (µg/Kg)	RPD
98384001	PCB138	9	5	57
98384001	PCB126	2	1	67
98384001	PCB170	3	9	100
98384002DIL	PCB101	21	42	67
98384002DIL	PCB77	133	6	183
98384002DIL	PCB123	28	6	129
98384002DIL	PCB114	3	10	108
98384002DIL	PCB138	36	19	62
98384002DIL	PCB195	2	29	174
98384002DIL	PCB206	2	1	67
98384003	PCB28	1	3	100
98384003	PCB52	4	7	55
98384003	PCB101	3	5	50
98384003	PCB114	2	1	67
98384003	PCB138	9	5	57
98384004	PCB18	24	51	72
98384004	PCB101	28	57	68
98384004	PCB77	156	6	185
98384004	PCB123	69	7	163
98384004	PCB114	5	14	95
98384004	PCB138	87	46	62
98384004	PCB189	1	2	67
98384004DIL	PCB18	40	75	61
98384004DIL	PCB101	52	67	25
98384004DIL	PCB77	252	6	191
98384004DIL	PCB123	124	11	167
98384004DIL	PCB114	7	23	107

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Sample Number	Compound	DB-5 Conc (µg/Kg)	DB-1701 Conc (µg/Kg)	RPD
98384004DIL	PCB126	28	13	73
98384004DIL	PCB157	6	30	133
98384004DIL	PCB189	2	4	67
98384004DIL	PCB209	1	2	67
98384005	PCB101	2	3	40
98384005	PCB138	6	3	67
98384005	PCB170	2	3	40
98384006	PCB52	1	4	120
98384006	PCB66	2	1	67
98384006	PCB153	1	2	67
98384007	PCB18	1	3	100
98384007	PCB28	1	3	100
98384007	PCB52	3	8	91
98384007	PCB44	3	1	100
98384007	PCB101	3	6	67
98384007	PCB123	9	2	127
98384007	PCB138	11	7	44
98384007	PCB128	1	2	67
98384007	PCB170	4	10	86
98384008	PCB28	2	4	67
98384008	PCB101	3	6	67
98384008	PCB138	11	6	59
98384008	PCB189	2	6	100
98384009	PCB28	2	3	40
98384009	PCB101	2	4	67
98384009	PCB138	7	4	55
98384009	PCB126	3	1	100

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Site. Duwamish River

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Sample Number	Compound	DB-5 Conc (µg/Kg)	DB-1701 Conc (µg/Kg)	RPD
98384009	PCB128	1	2	67

Differences can arise from analytical interferences on one column. However, the RPDs are not deemed significant at the reported concentrations. The lower concentration was reported for each analyte, unless interferences or coelution prevented use of the lower concentration.

12 Sample Analysis

A cursory review of raw data was performed. All laboratory deliverables were present and complete. A duplicate analysis was performed on Batch QC sample K9806066-002. All RPD values for the replicates were less than 35% with the exception of PCB52, PCB66, PCB101 and PCB180. RPD values for these compounds were 40% for PCB52, PCB101 and PCB180. The RPD value for PCB66 was 50%. As this sample was Batch QC and may not necessarily represent samples within this SDG, no qualifiers were assigned based on duplicate results. The case narrative noted that several congeners in the LCS, MS and MSD do not meet QC limits. No laboratory QC limits have been developed for congeners. No other complications were noted.

13. Laboratory Contact

The laboratory was not contacted

Data Assessment

Upon consideration of the data qualifications noted above, the data are ACCEPTABLE for use except where flagged with data qualifiers that modify the usefulness of the individual values

Data Qualifiers

- U - The compound was analyzed for, but was not detected.
- UJ - The compound was analyzed for, but was not detected. The associated quantitation limit is an estimate because quality control criteria were not met.

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- J - The analyte was positively identified, but the associated numerical value is an estimated quantity because quality control criteria were not met or because concentrations reported are less than CRDL or lowest calibration standard.
- R - Quality control indicates that data are unusable (compound may or may not be present) Resampling and reanalysis are necessary for verification.
- N - Presumptive evidence of presence of material (tentative identification).
- I - Elevated reporting limit due to matrix interference

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9806374
Date Collected: 9/14/98
Date Received: 9/15/98

Congener Specific PCBs

Sample Name 98384000 Units ug/Kg (ppb)
 Lab Code K9806374-001 Basis Dry
 Test Notes

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
PCB 18	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	UJ
PCB 28	EPA 3550B	8082	1	1	10/22/98	11/2/98	2	J
PCB 52	EPA 3550B	8082	1	1	10/22/98	11/2/98	2	J
PCB 44	EPA 3550B	8082	1	1	10/22/98	11/2/98	1	J
PCB 66	EPA 3550B	8082	1	1	10/22/98	11/2/98	4	
PCB 101	EPA 3550B	8082	1	1	10/22/98	11/2/98	3	J
PCB 81	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 77	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	UJ
PCB 123	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 118	EPA 3550B	8082	1	1	10/22/98	11/2/98	2	
PCB 114	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 153	EPA 3550B	8082	1	1	10/22/98	11/2/98	4	
PCB 105	EPA 3550B	8082	1	1	10/22/98	11/2/98	1	
PCB 138	EPA 3550B	8082	1	1	10/22/98	11/2/98	5	
PCB 126	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 187	EPA 3550B	8082	1	1	10/22/98	11/2/98	2	
PCB 128	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	UJ
PCB 167	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 156	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 157	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 180	EPA 3550B	8082	1	1	10/22/98	11/2/98	3	
PCB 169	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 170	EPA 3550B	8082	1	1	10/22/98	11/2/98	2	
PCB 189	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 195	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 206	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 209	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	

10/12/15/98

Approved By

B. Wiegand

Date

11/13/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9806374
Date Collected: 9/14/98
Date Received: 9/15/98

Congener Specific PCBs

Sample Name 98384001 Units ug/Kg (ppb)
 Lab Code K9806374-002 Basis Dry
 Test Notes

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
PCB 18	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	WJ
PCB 28	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	WJ
PCB 52	EPA 3550B	8082	1	1	10/22/98	11/2/98	3	J
PCB 44	EPA 3550B	8082	1	1	10/22/98	11/2/98	1	J
PCB 66	EPA 3550B	8082	1	1	10/22/98	11/2/98	5	
PCB 101	EPA 3550B	8082	1	1	10/22/98	11/2/98	5	J
PCB 81	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 77	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	WJ
PCB 123	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 118	EPA 3550B	8082	1	1	10/22/98	11/2/98	4	
PCB 114	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 153	EPA 3550B	8082	1	1	10/22/98	11/2/98	7	
PCB 105	EPA 3550B	8082	1	1	10/22/98	11/2/98	1	
PCB 138	EPA 3550B	8082	1	1	10/22/98	11/2/98	8	
PCB 126	EPA 3550B	8082	1	1	10/22/98	11/2/98	1	
PCB 187	EPA 3550B	8082	1	1	10/22/98	11/2/98	3	
PCB 128	EPA 3550B	8082	1	1	10/22/98	11/2/98	1	J
PCB 167	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 156	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 157	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 180	EPA 3550B	8082	1	1	10/22/98	11/2/98	4	
PCB 169	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 170	EPA 3550B	8082	1	1	10/22/98	11/2/98	2	
PCB 189	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 195	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 206	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 209	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	

WJT 12/15/98

Approved By
1844021397p

D. Wuegel

Date 11/13/98

00038

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9806374
Date Collected: 9/14/98
Date Received: 9/15/98

Congener Specific PCBs

Sample Name 98384002 Units ug/Kg (ppb)
 Lab Code K9806374-003 Basis Dry
 Test Notes

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
PCB 18	EPA 3550B	8082	1	2	10/22/98	11/2/98	ND	UJ
PCB 28	EPA 3550B	8082	1	2	10/22/98	11/2/98	20	J
PCB 52	EPA 3550B	8082	1	2	10/22/98	11/2/98	48	
PCB 44	EPA 3550B	8082	1	2	10/22/98	11/2/98	48	↓
PCB 66	EPA 3550B	8082	1	2	10/22/98	11/2/98	88	
PCB 101	EPA 3550B	8082	1	2	10/22/98	11/2/98	42	J
PCB 81	EPA 3550B	8082	1	2	10/22/98	11/2/98	ND	
PCB 77	EPA 3550B	8082	7	2	10/22/98	11/2/98	ND	UJI B
PCB 123	EPA 3550B	8082	6	2	10/22/98	11/2/98	ND	UJ B
PCB 118	EPA 3550B	8082	1	2	10/22/98	11/2/98	40	
PCB 114	EPA 3550B	8082	1	2	10/22/98	11/2/98	3	
PCB 153	EPA 3550B	8082	1	2	10/22/98	11/2/98	27	
PCB 105	EPA 3550B	8082	1	2	10/22/98	11/2/98	27	
PCB 138	EPA 3550B	8082	1	2	10/22/98	11/2/98	36	
PCB 126	EPA 3550B	8082	1	2	10/22/98	11/2/98	3	
PCB 187	EPA 3550B	8082	1	2	10/22/98	11/2/98	10	
PCB 128	EPA 3550B	8082	1	2	10/22/98	11/2/98	5	J
PCB 167	EPA 3550B	8082	1	2	10/22/98	11/2/98	2	
PCB 156	EPA 3550B	8082	1	2	10/22/98	11/2/98	4	
PCB 157	EPA 3550B	8082	1	2	10/22/98	11/2/98	ND	
PCB 180	EPA 3550B	8082	1	2	10/22/98	11/2/98	14	
PCB 169	EPA 3550B	8082	1	2	10/22/98	11/2/98	ND	
PCB 170	EPA 3550B	8082	1	2	10/22/98	11/2/98	9	
PCB 189	EPA 3550B	8082	1	2	10/22/98	11/2/98	ND	
PCB 195	EPA 3550B	8082	2	2	10/22/98	11/2/98	ND	UJ B
PCB 206	EPA 3550B	8082	1	2	10/22/98	11/2/98	1	
PCB 209	EPA 3550B	8082	1	2	10/22/98	11/2/98	ND	

B The MRL is elevated because of matrix interferences

WJT 12/15/98

Approved By

D. Wiegel

Date

11/13/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9806374
Date Collected: 9/14/98
Date Received: 9/15/98

Congener Specific PCBs

Sample Name 98384003 Units ug/Kg (ppb)
 Lab Code K9806374-004 Basis Dry
 Test Notes

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
PCB 18	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	UJ
PCB 28	EPA 3550B	8082	1	1	10/22/98	11/2/98	3	J
PCB 52	EPA 3550B	8082	1	1	10/22/98	11/2/98	4	↓
PCB 44	EPA 3550B	8082	1	1	10/22/98	11/2/98	2	↓
PCB 66	EPA 3550B	8082	1	1	10/22/98	11/2/98	7	
PCB 101	EPA 3550B	8082	1	1	10/22/98	11/2/98	5	J
PCB 81	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 77	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	UJ
PCB 123	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 118	EPA 3550B	8082	1	1	10/22/98	11/2/98	5	
PCB 114	EPA 3550B	8082	1	1	10/22/98	11/2/98	1	
PCB 153	EPA 3550B	8082	1	1	10/22/98	11/2/98	6	
PCB 105	EPA 3550B	8082	1	1	10/22/98	11/2/98	2	
PCB 138	EPA 3550B	8082	1	1	10/22/98	11/2/98	9	
PCB 126	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 187	EPA 3550B	8082	1	1	10/22/98	11/2/98	3	
PCB 128	EPA 3550B	8082	1	1	10/22/98	11/2/98	1	J
PCB 167	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 156	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 157	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 180	EPA 3550B	8082	1	1	10/22/98	11/2/98	4	
PCB 169	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 170	EPA 3550B	8082	1	1	10/22/98	11/2/98	2	
PCB 189	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 195	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 206	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 209	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	

MGT 12/15/98

Approved By _____
1844/021397p

D. Wegel

Date 11/13/98

00040

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9806374
Date Collected: 9/14/98
Date Received: 9/15/98

Congener Specific PCBs

Sample Name 98384004 Units ug/Kg (ppb)
 Lab Code K9806374-005 Basis Dry
 Test Notes

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
PCB 18	EPA 3550B	8082	24	1	10/22/98	11/3/98	ND	UI J B
PCB 28	EPA 3550B	8082	10	10	10/22/98	11/5/98	110	J
PCB 52	EPA 3550B	8082	10	10	10/22/98	11/5/98	100	J
PCB 44	EPA 3550B	8082	1	1	10/22/98	11/3/98	44	J
PCB 66	EPA 3550B	8082	10	10	10/22/98	11/5/98	160	
PCB 101	EPA 3550B	8082	10	10	10/22/98	11/5/98	87	J
PCB 81	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 77	EPA 3550B	8082	6	1	10/22/98	11/3/98	ND	UI J B
PCB 123	EPA 3550B	8082	7	1	10/22/98	11/3/98	ND	UI B
PCB 118	EPA 3550B	8082	1	1	10/22/98	11/3/98	44	
PCB 114	EPA 3550B	8082	1	1	10/22/98	11/3/98	5	
PCB 153	EPA 3550B	8082	10	10	10/22/98	11/5/98	120	
PCB 105	EPA 3550B	8082	1	1	10/22/98	11/3/98	22	
PCB 138	EPA 3550B	8082	10	10	10/22/98	11/5/98	140	
PCB 126	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 187	EPA 3550B	8082	1	1	10/22/98	11/3/98	32	
PCB 128	EPA 3550B	8082	1	1	10/22/98	11/3/98	11	J
PCB 167	EPA 3550B	8082	1	1	10/22/98	11/3/98	3	
PCB 156	EPA 3550B	8082	1	1	10/22/98	11/3/98	7	
PCB 157	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 180	EPA 3550B	8082	10	10	10/22/98	11/5/98	93	
PCB 169	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 170	EPA 3550B	8082	1	1	10/22/98	11/3/98	31	
PCB 189	EPA 3550B	8082	1	1	10/22/98	11/3/98	1	
PCB 195	EPA 3550B	8082	1	1	10/22/98	11/3/98	7	
PCB 206	EPA 3550B	8082	1	1	10/22/98	11/3/98	4	
PCB 209	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	

B The MRL is elevated because of matrix interferences

MGT 12/15/98

Approved By

D. Wuegel

Date

11/13/98

00041

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9806374
Date Collected: 9/14/98
Date Received: 9/15/98

Congener Specific PCBs

Sample Name 98384005 Units ug/Kg (ppb)
 Lab Code K9806374-006 Basis Dry
 Test Notes

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
PCB 18	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	UJ
PCB 28	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	UJ
PCB 52	EPA 3550B	8082	1	1	10/22/98	11/2/98	3	J
PCB 44	EPA 3550B	8082	1	1	10/22/98	11/2/98	2	J
PCB 66	EPA 3550B	8082	1	1	10/22/98	11/2/98	4	
PCB 101	EPA 3550B	8082	1	1	10/22/98	11/2/98	3	J
PCB 81	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 77	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	UJ
PCB 123	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 118	EPA 3550B	8082	1	1	10/22/98	11/2/98	3	
PCB 114	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 153	EPA 3550B	8082	1	1	10/22/98	11/2/98	5	
PCB 105	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 138	EPA 3550B	8082	1	1	10/22/98	11/2/98	6	
PCB 126	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 187	EPA 3550B	8082	1	1	10/22/98	11/2/98	3	
PCB 128	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	UJ
PCB 167	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 156	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 157	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 180	EPA 3550B	8082	1	1	10/22/98	11/2/98	4	
PCB 169	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 170	EPA 3550B	8082	1	1	10/22/98	11/2/98	2	
PCB 189	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 195	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 206	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	
PCB 209	EPA 3550B	8082	1	1	10/22/98	11/2/98	ND	

ngt nj/1/98

Approved By _____
1844/021397p

D. Wiegell

Date

11/13/98

00042

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9806374
Date Collected: 9/14/98
Date Received: 9/15/98

Congener Specific PCBs

Sample Name 98384006 Units ug/Kg (ppb)
 Lab Code K9806374-007 Basis Dry
 Test Notes

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
PCB 18	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	WJ
PCB 28	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	WJ
PCB 52	EPA 3550B	8082	1	1	10/22/98	11/3/98	1	J
PCB 44	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	WJ
PCB 66	EPA 3550B	8082	1	1	10/22/98	11/3/98	1	
PCB 101	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	WJ
PCB 81	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 77	EPA 3550B	8082	1	1	10/22/98	11/3/98	3	J
PCB 123	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 118	EPA 3550B	8082	1	1	10/22/98	11/3/98	1	
PCB 114	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 153	EPA 3550B	8082	1	1	10/22/98	11/3/98	1	
PCB 105	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 138	EPA 3550B	8082	1	1	10/22/98	11/3/98	1	
PCB 126	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 187	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 128	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	WJ
PCB 167	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 156	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 157	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 180	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 169	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 170	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 189	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 195	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 206	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 209	EPA 3550B	8082	1	1	10/22/98	11/3/98	1	

WJT 12/1/98

Approved By

D. Wegel

Date

11/13/98

00043

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
 Project: Duwamish River/4000-027-001-2019-38
 Sample Matrix: Sediment

Service Request: K9806374
 Date Collected: 9/14/98
 Date Received: 9/15/98

Congener Specific PCBs

Sample Name 98384007 Units ug/Kg (ppb)
 Lab Code K9806374-008 Basis Dry
 Test Notes

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
PCB 18	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	WJ
PCB 28	EPA 3550B	8082	1	1	10/22/98	11/3/98	1	J
PCB 52	EPA 3550B	8082	3	1	10/22/98	11/3/98	ND	WJ J B
PCB 44	EPA 3550B	8082	1	1	10/22/98	11/3/98	2	J
PCB 66	EPA 3550B	8082	1	1	10/22/98	11/3/98	6	
PCB 101	EPA 3550B	8082	1	1	10/22/98	11/3/98	6	J
PCB 81	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 77	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	WJ
PCB 123	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 118	EPA 3550B	8082	1	1	10/22/98	11/3/98	5	
PCB 114	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 153	EPA 3550B	8082	1	1	10/22/98	11/3/98	9	
PCB 105	EPA 3550B	8082	1	1	10/22/98	11/3/98	2	
PCB 138	EPA 3550B	8082	1	1	10/22/98	11/3/98	11	
PCB 126	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 187	EPA 3550B	8082	1	1	10/22/98	11/3/98	5	
PCB 128	EPA 3550B	8082	1	1	10/22/98	11/3/98	1	J
PCB 167	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 156	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 157	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 180	EPA 3550B	8082	1	1	10/22/98	11/3/98	7	
PCB 169	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 170	EPA 3550B	8082	1	1	10/22/98	11/3/98	4	
PCB 189	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 195	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 206	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 209	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	

B The MRL is elevated because of matrix interferences

WJT 12/15/98

Approved By

D. Wuegel

Date

11/13/98

00044

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9806374
Date Collected: 9/14/98
Date Received: 9/15/98

Congener Specific PCBs

Sample Name: 98384008 Units: ug/Kg (ppb)
Lab Code: K9806374-009 Basis: Dry
Test Notes:

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
PCB 18	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	WJ
PCB 28	EPA 3550B	8082	1	1	10/22/98	11/3/98	3	J
PCB 52	EPA 3550B	8082	1	1	10/22/98	11/3/98	3	J
PCB 44	EPA 3550B	8082	1	1	10/22/98	11/3/98	2	J
PCB 66	EPA 3550B	8082	1	1	10/22/98	11/3/98	8	
PCB 101	EPA 3550B	8082	1	1	10/22/98	11/3/98	6	J
PCB 81	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 77	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	WJ
PCB 123	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 118	EPA 3550B	8082	1	1	10/22/98	11/3/98	6	
PCB 114	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 153	EPA 3550B	8082	1	1	10/22/98	11/3/98	8	
PCB 105	EPA 3550B	8082	1	1	10/22/98	11/3/98	3	
PCB 138	EPA 3550B	8082	1	1	10/22/98	11/3/98	11	
PCB 126	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 187	EPA 3550B	8082	1	1	10/22/98	11/3/98	3	
PCB 128	EPA 3550B	8082	1	1	10/22/98	11/3/98	2	J
PCB 167	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 156	EPA 3550B	8082	1	1	10/22/98	11/3/98	1	
PCB 157	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 180	EPA 3550B	8082	1	1	10/22/98	11/3/98	4	
PCB 169	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 170	EPA 3550B	8082	1	1	10/22/98	11/3/98	3	
PCB 189	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 195	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 206	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 209	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	

WJT 12/15/98

Approved By
1544021397p

D. Weigel

Date 11/13/98

00045

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9806374
Date Collected: 9/14/98
Date Received: 9/15/98

Congener Specific PCBs

Sample Name 98384009 Units ug/Kg (ppb)
 Lab Code K9806374-010 Basis Dry
 Test Notes

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
PCB 18	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	WJ
PCB 28	EPA 3550B	8082	2	1	10/22/98	11/3/98	ND	WJ J B
PCB 52	EPA 3550B	8082	1	1	10/22/98	11/3/98	3	J
PCB 44	EPA 3550B	8082	1	1	10/22/98	11/3/98	2	J
PCB 66	EPA 3550B	8082	1	1	10/22/98	11/3/98	6	
PCB 101	EPA 3550B	8082	1	1	10/22/98	11/3/98	4	J
PCB 81	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 77	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	WJ
PCB 123	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 118	EPA 3550B	8082	1	1	10/22/98	11/3/98	4	
PCB 114	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 153	EPA 3550B	8082	1	1	10/22/98	11/3/98	6	
PCB 105	EPA 3550B	8082	1	1	10/22/98	11/3/98	2	
PCB 138	EPA 3550B	8082	1	1	10/22/98	11/3/98	8	
PCB 126	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 187	EPA 3550B	8082	1	1	10/22/98	11/3/98	3	
PCB 128	EPA 3550B	8082	1	1	10/22/98	11/3/98	1	J
PCB 167	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 156	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 157	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 180	EPA 3550B	8082	1	1	10/22/98	11/3/98	4	
PCB 169	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 170	EPA 3550B	8082	1	1	10/22/98	11/3/98	2	
PCB 189	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 195	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 206	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	
PCB 209	EPA 3550B	8082	1	1	10/22/98	11/3/98	ND	

B The MRL is elevated because of matrix interferences

7/9/98 12/1/98

Approved By D. Weigel Date 11/13/98

00046